

FIG. 1A
(PRIOR ART)

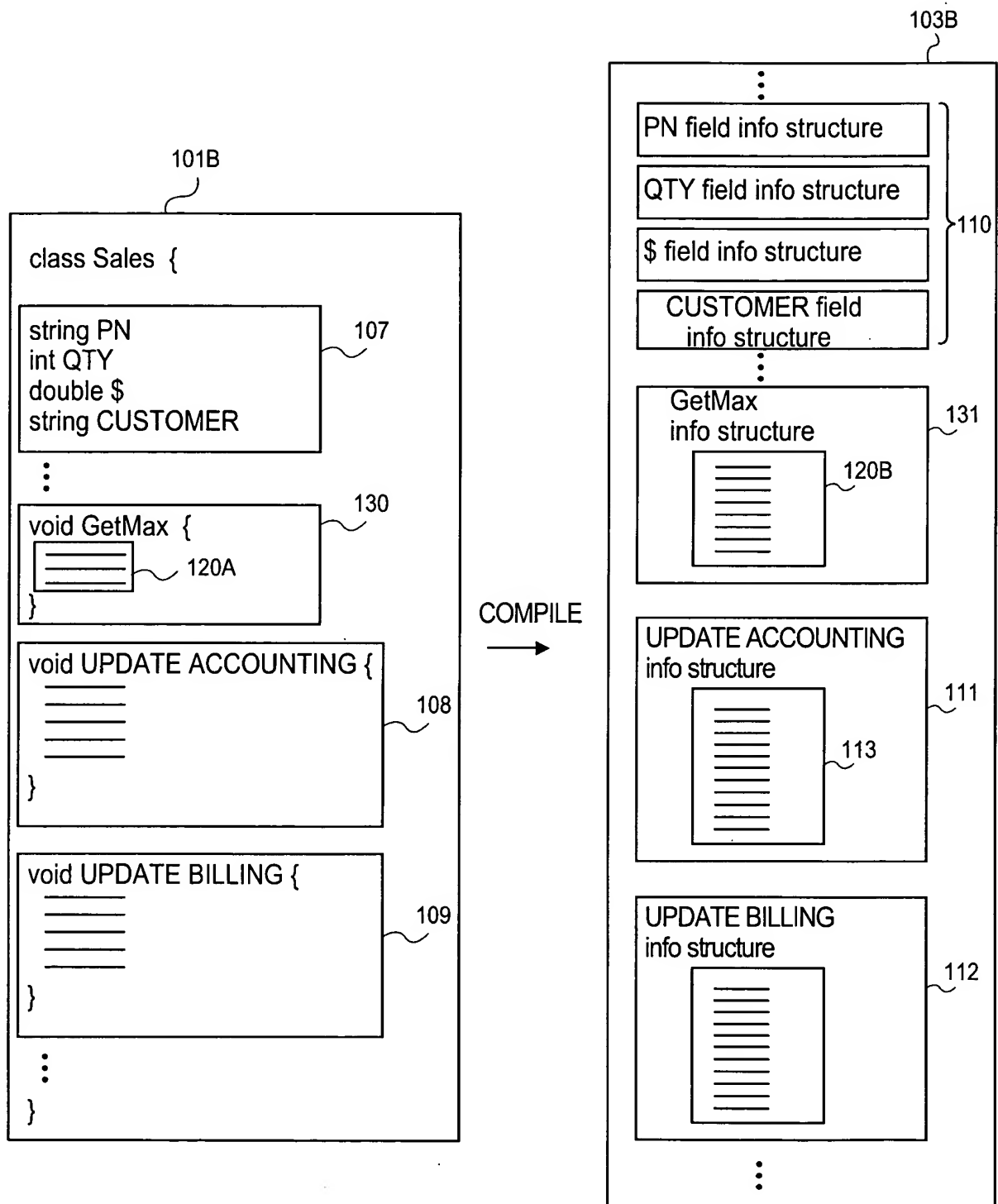


FIG. 1B
(PRIOR ART)

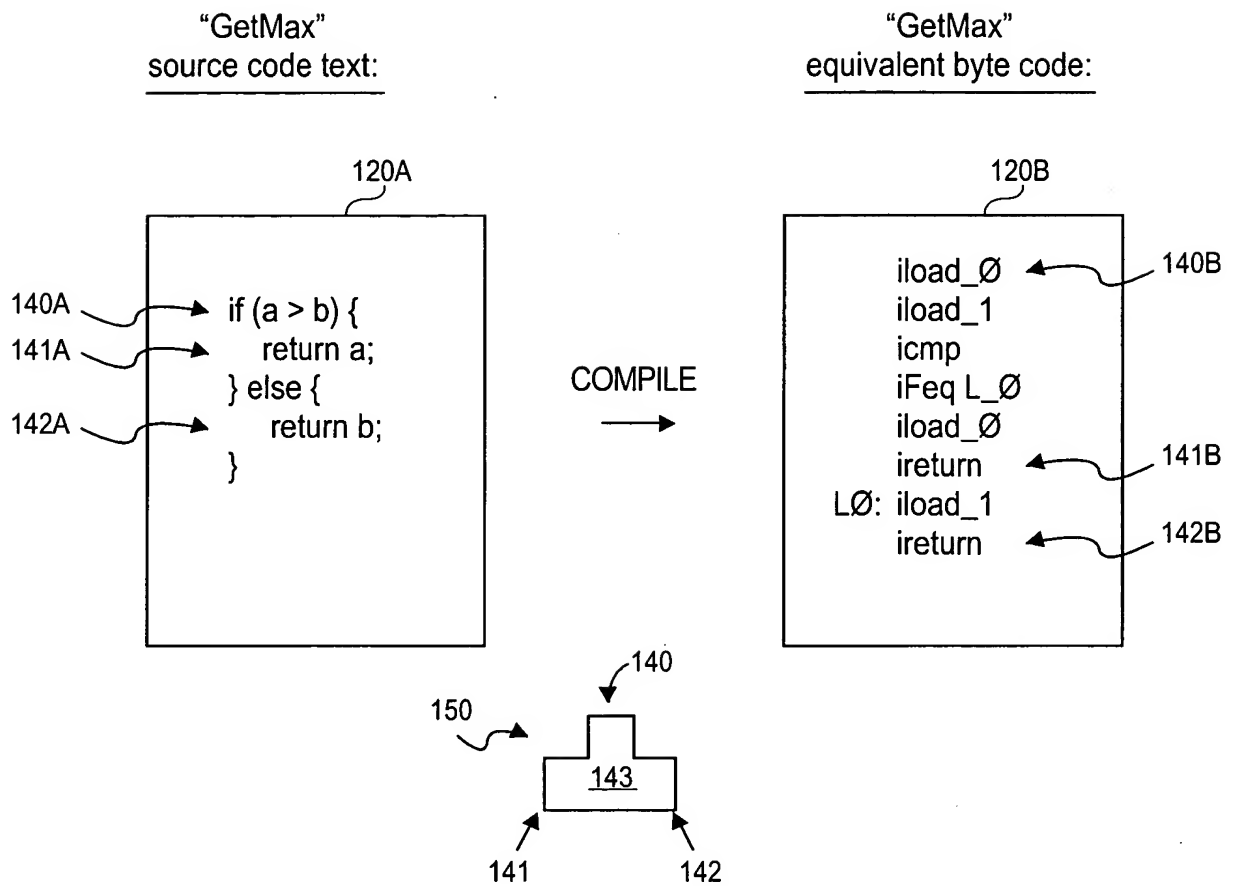


FIG. 1C
(PRIOR ART)

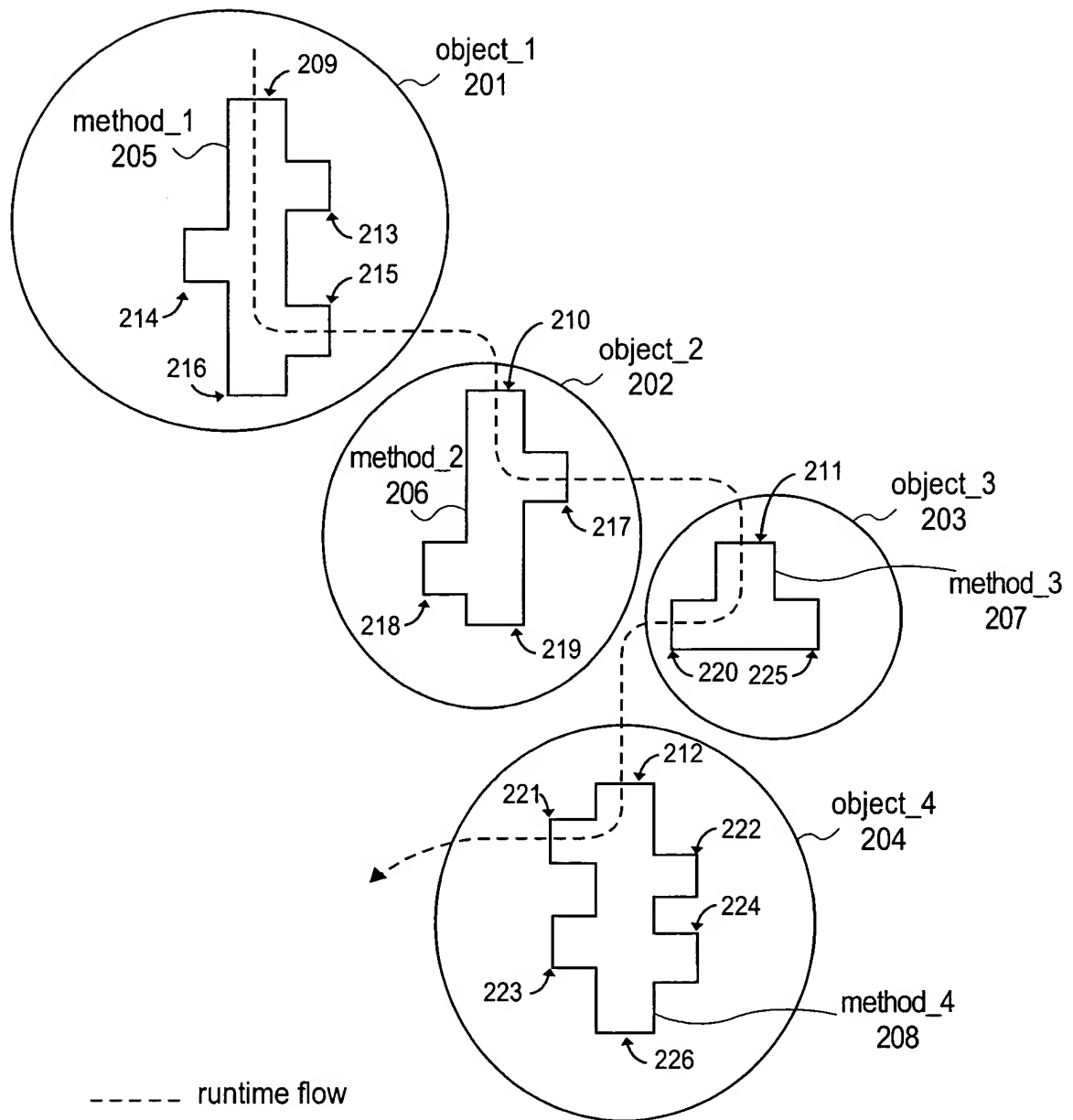


FIG. 1D
(PRIOR ART)

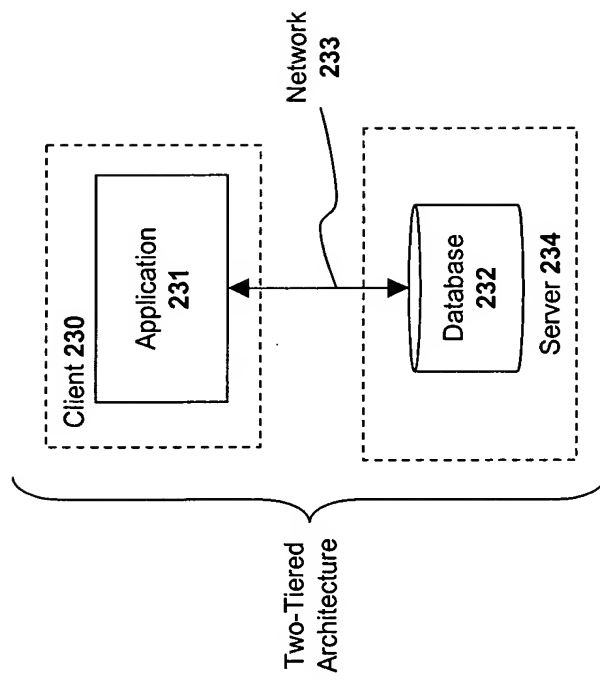


FIG. 2A
(prior art)

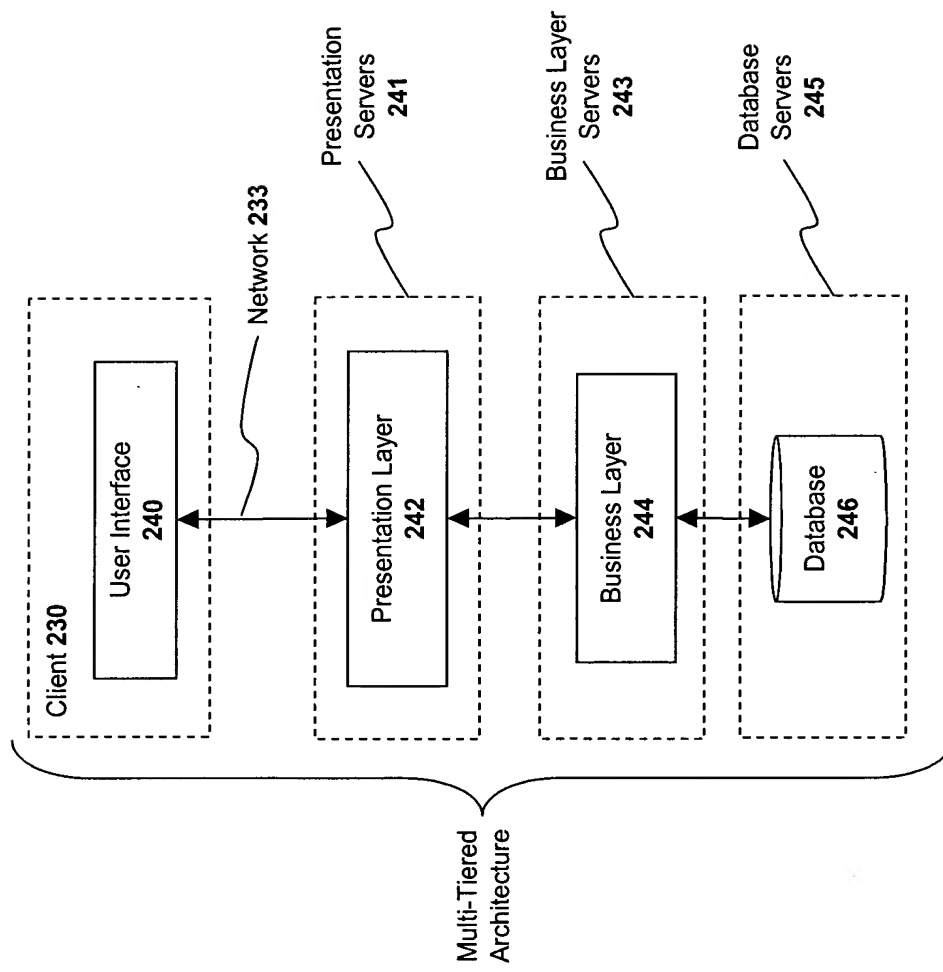


FIG. 2B
(prior art)

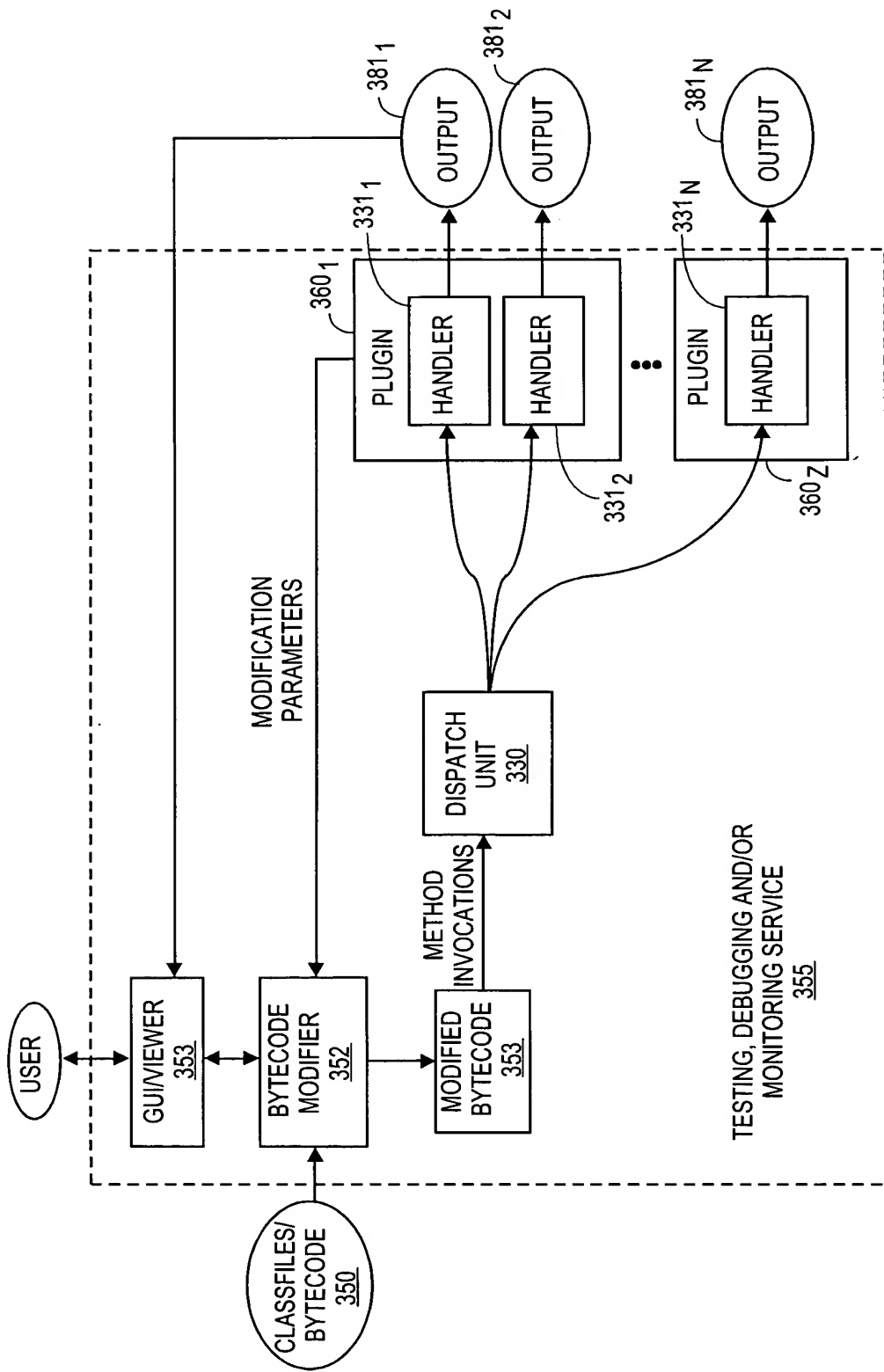


FIG. 3

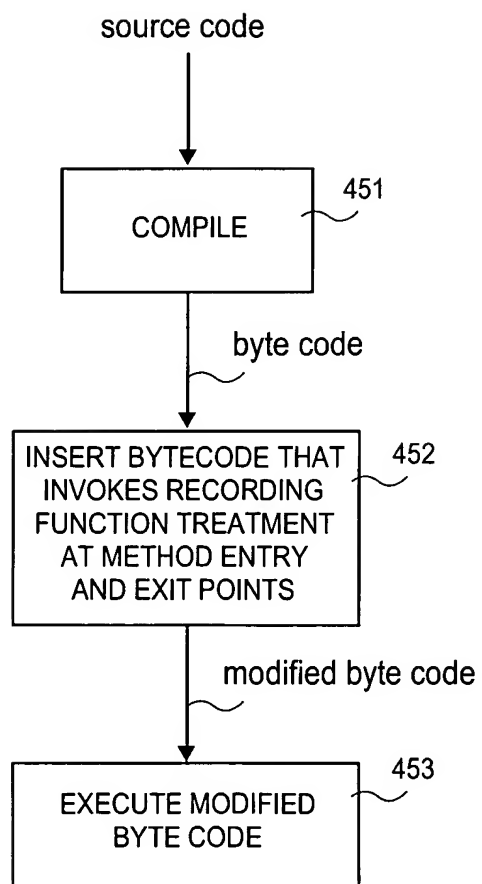


FIG. 4A

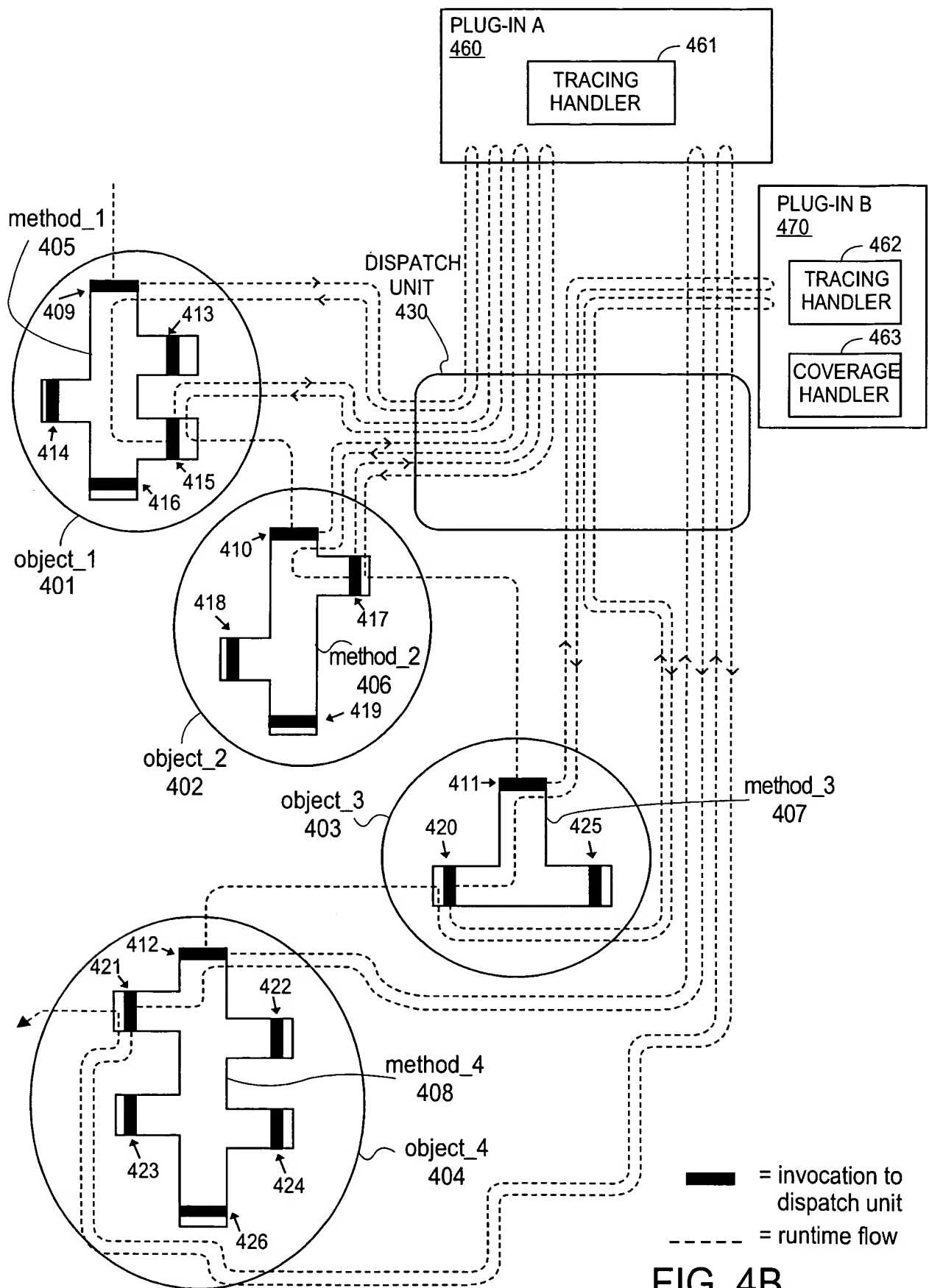
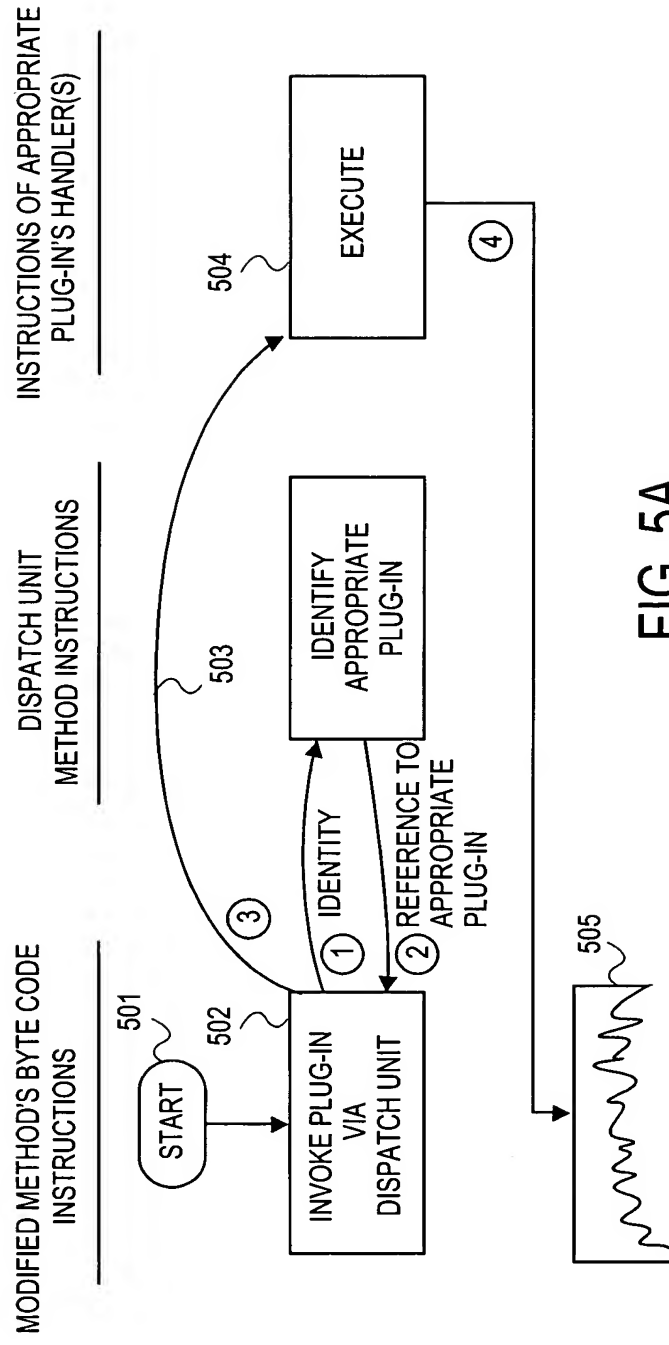


FIG. 4B



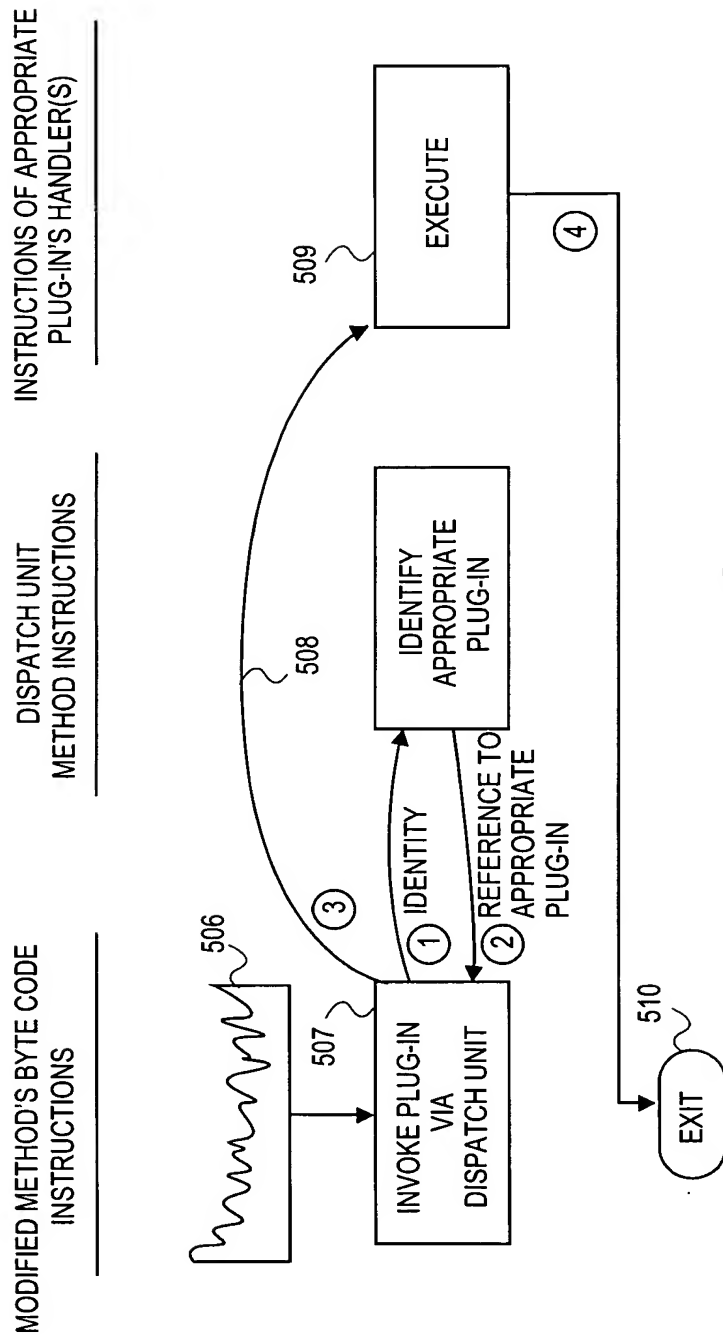


FIG. 5B

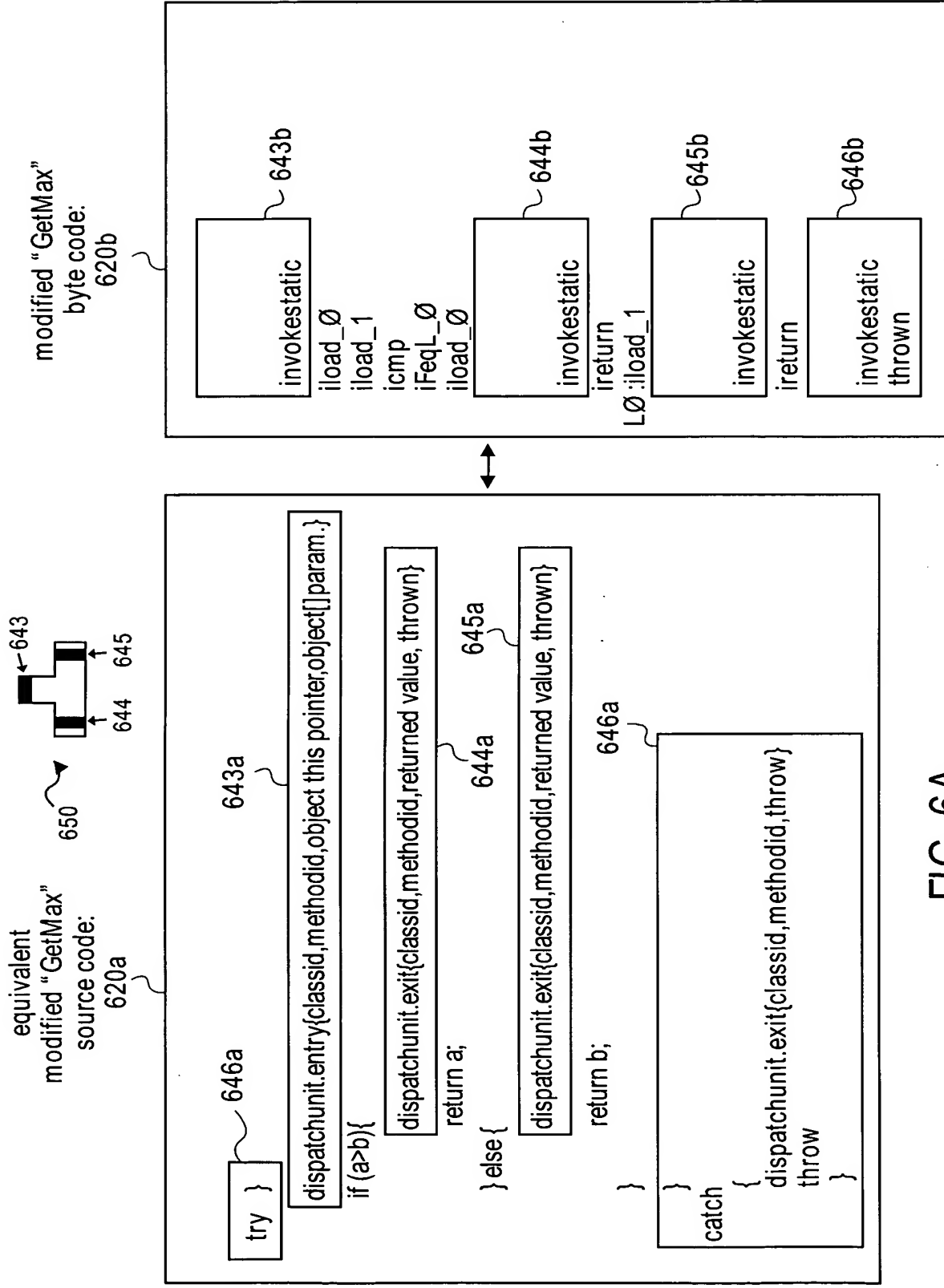


FIG. 6A

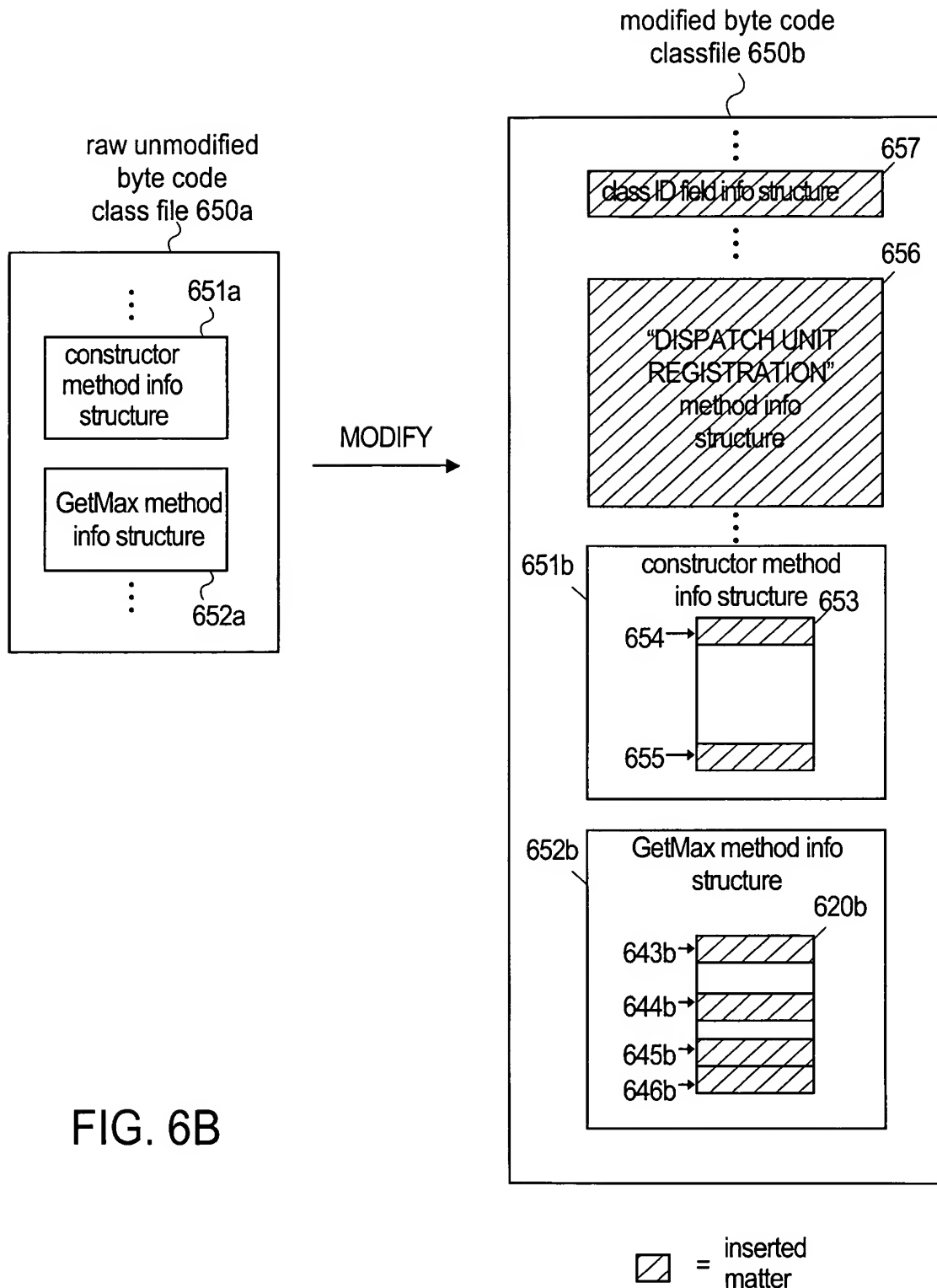


FIG. 6B

701

	INVOKING METHOD	PLUG IN MODULE
(method_1)	C ₁ , M ₁ , args ₁₁	PIM_A
(method_2)	C ₁ , M ₂ , args ₁₂	PIM_A
(method_3)	C ₂ , M ₁ , args ₂₁	PIM_B
(method_4)	C ₃ , M ₁ , args ₃₁	PIM_A

FIG. 7

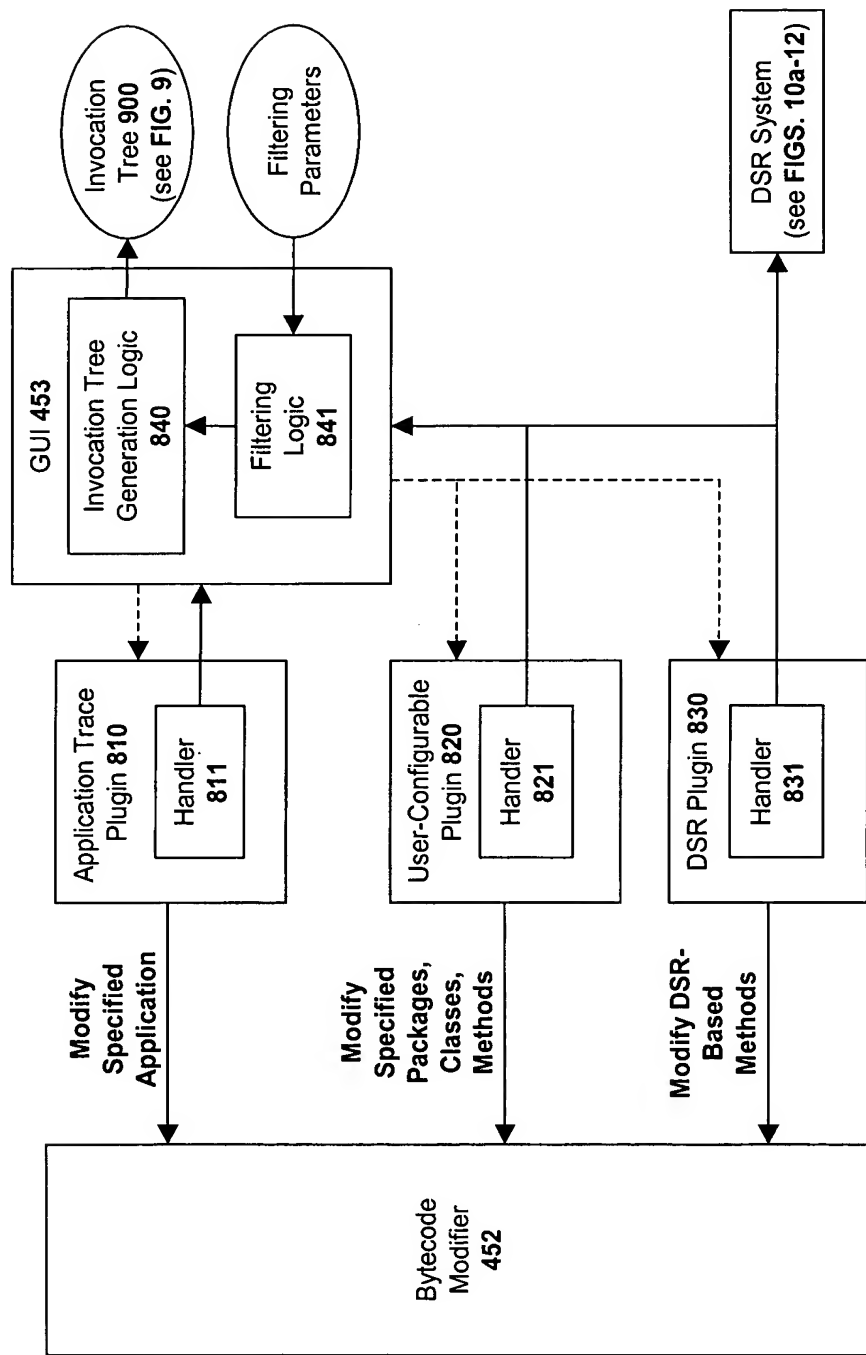


FIG. 8

Invocation Tree

900

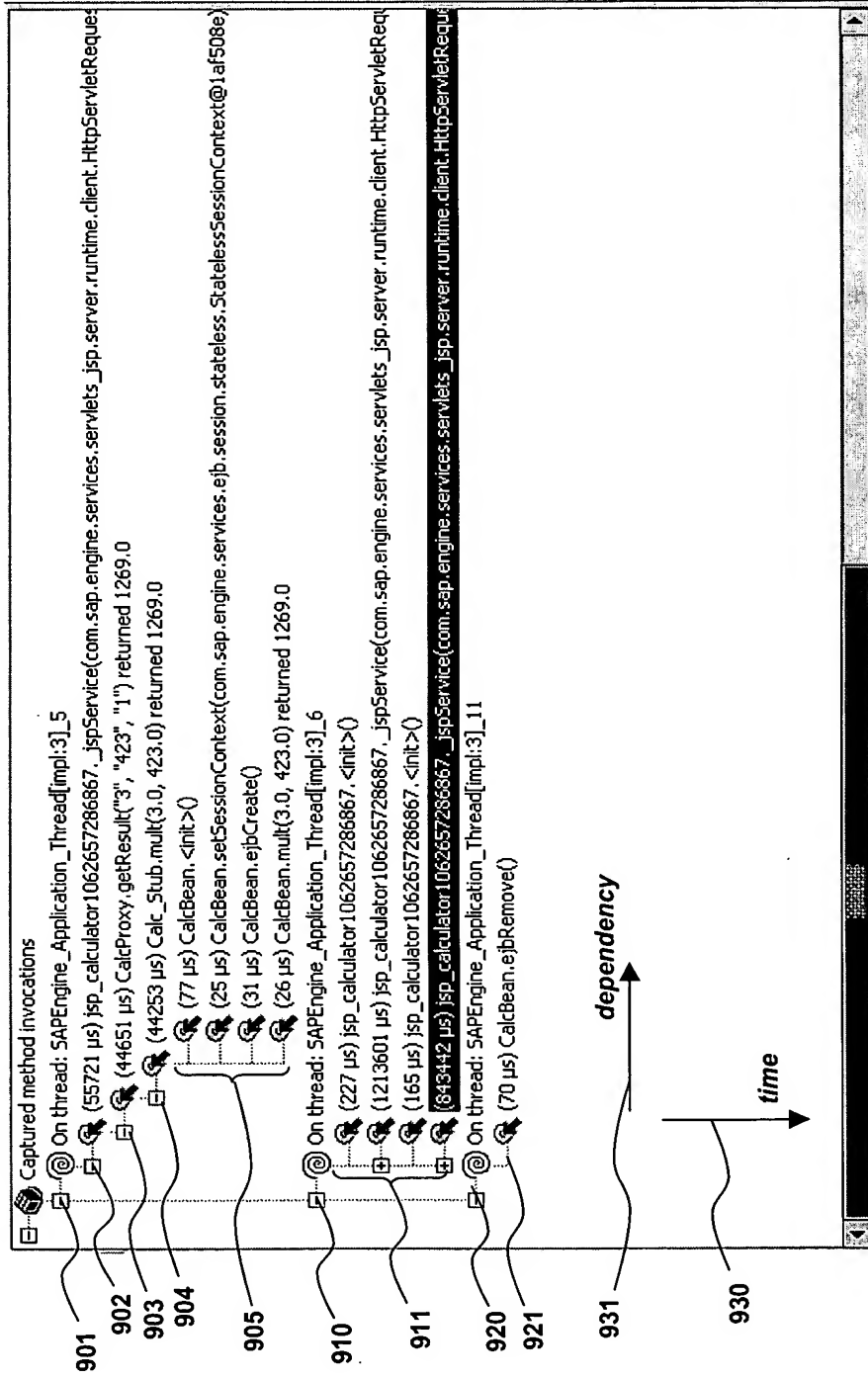


FIG. 9A

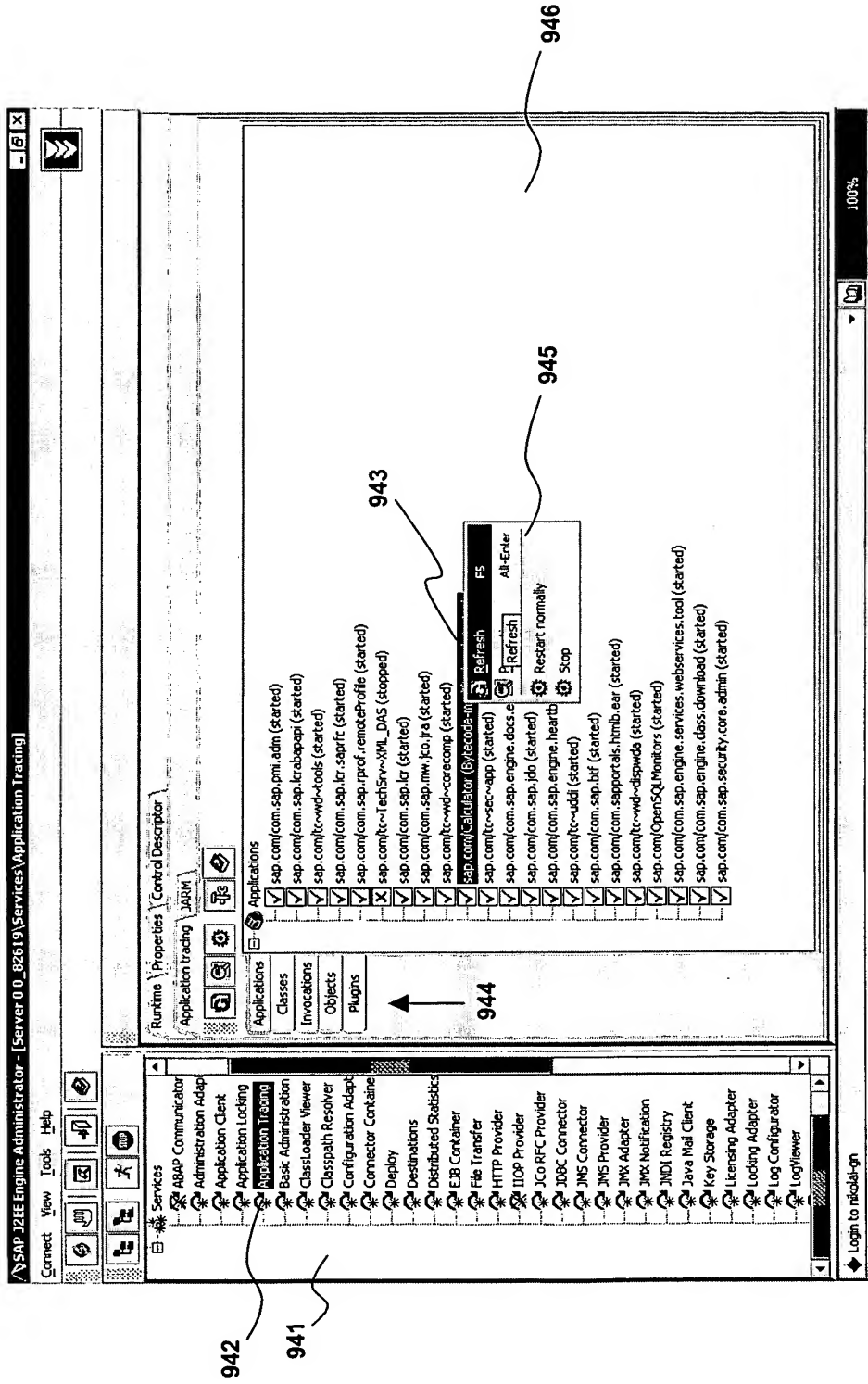


FIG. 9B

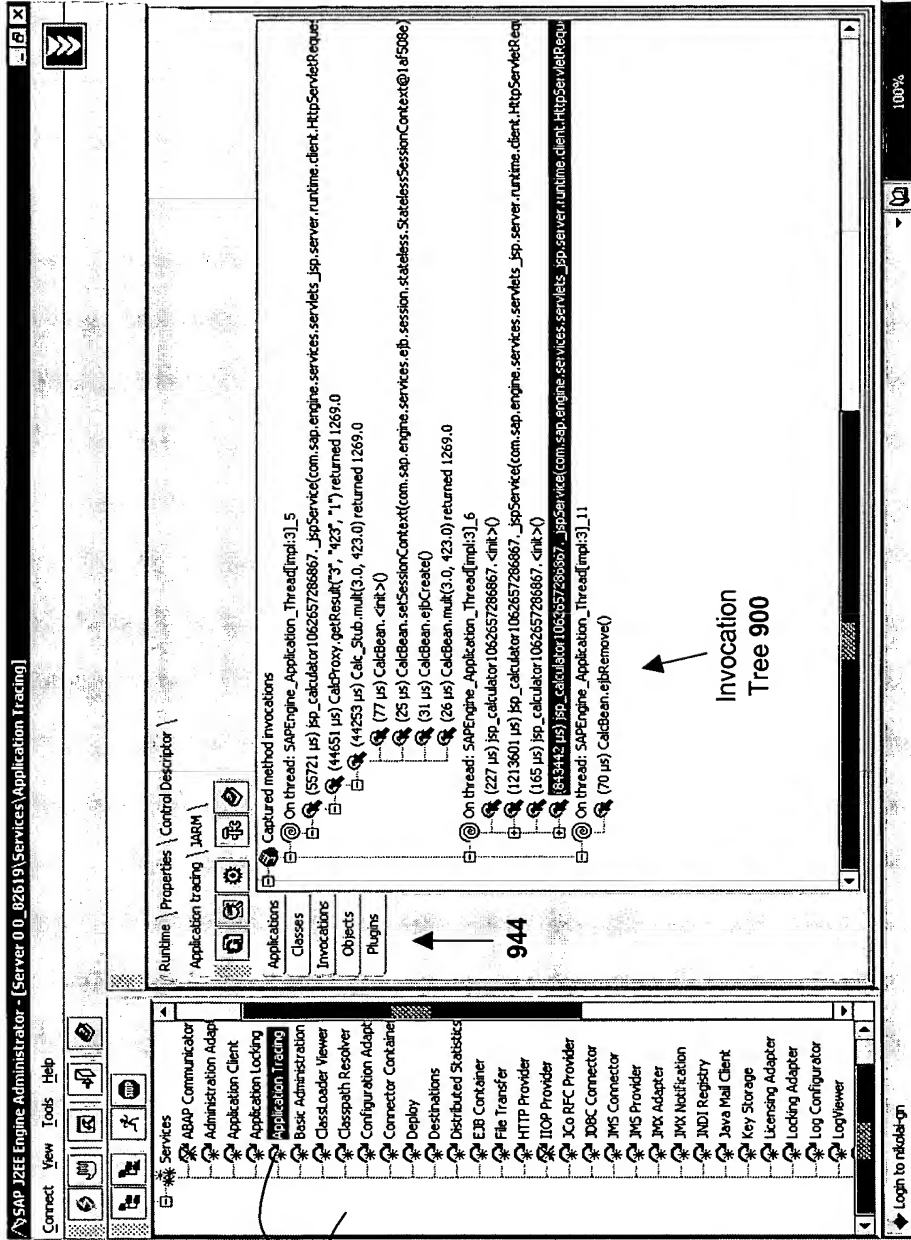


FIG. 9C

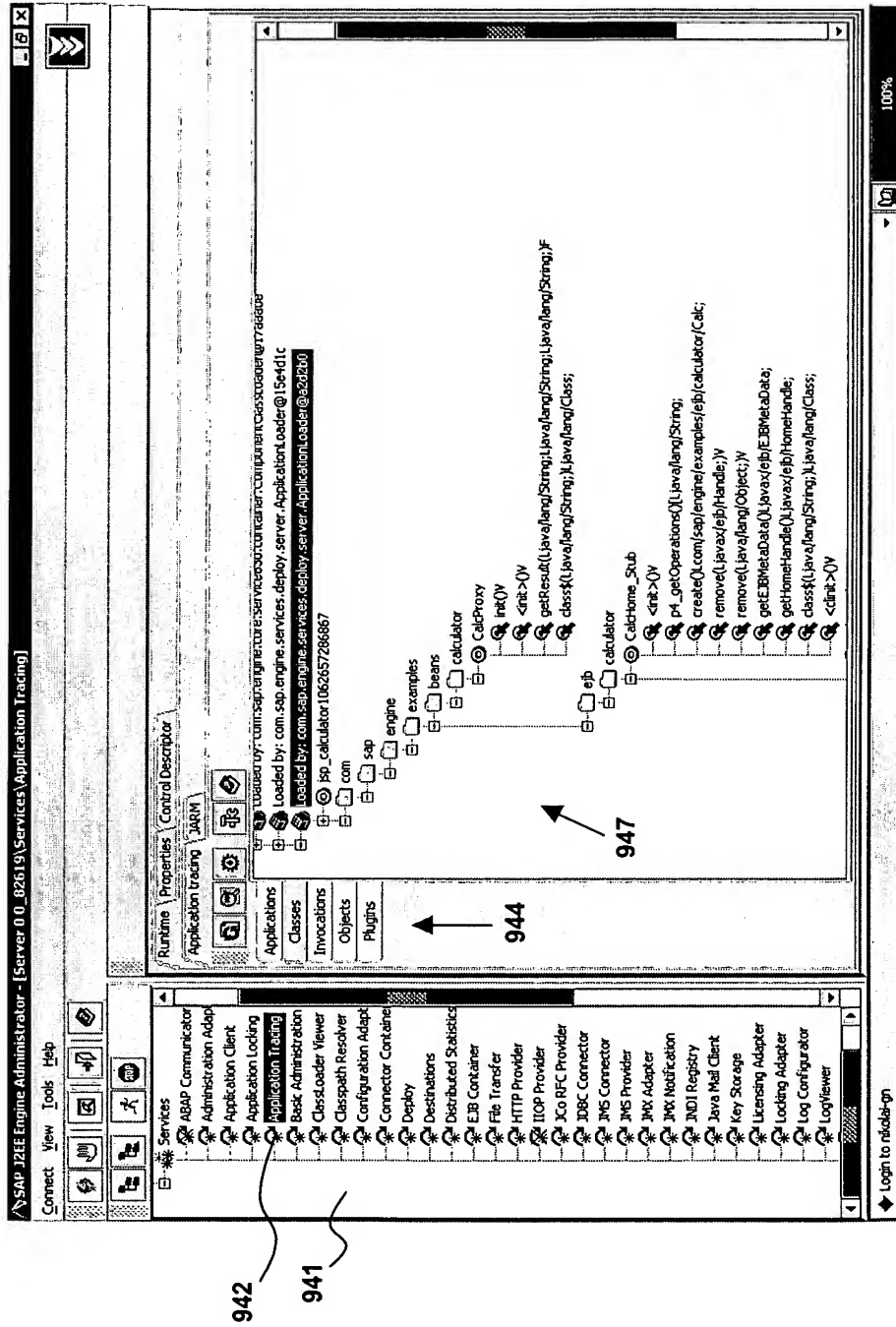


FIG. 9D

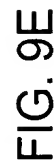


FIG. 9E

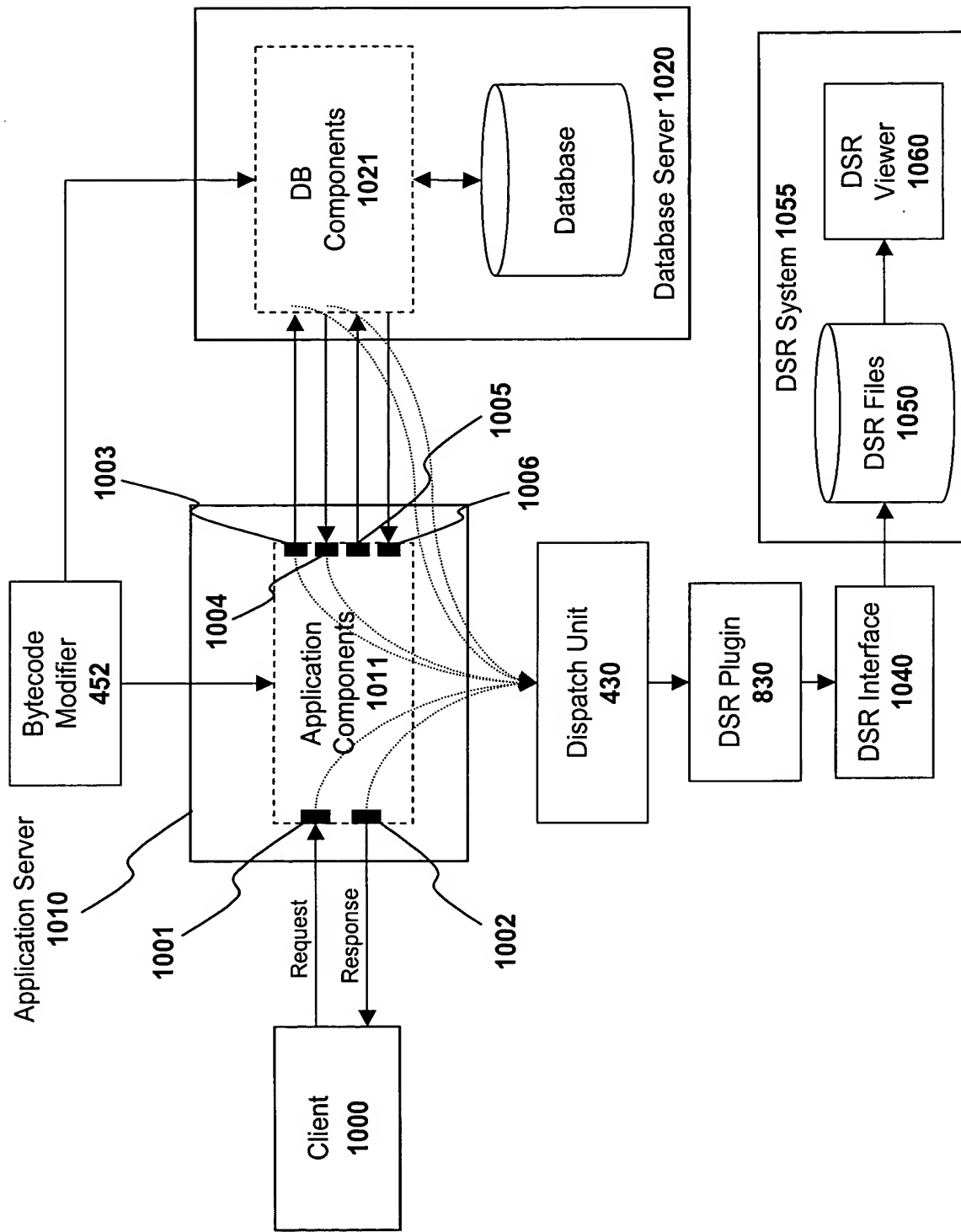


FIG. 10A

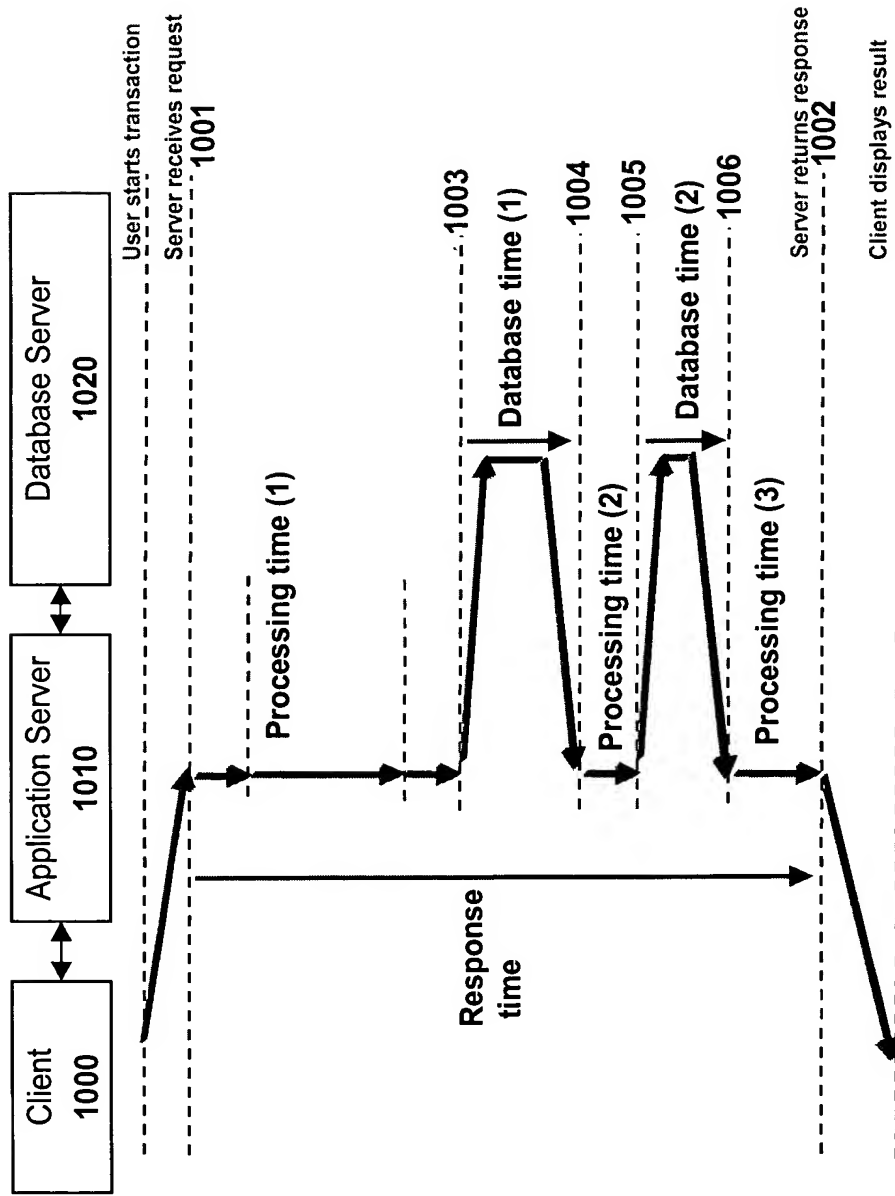


FIG. 10B

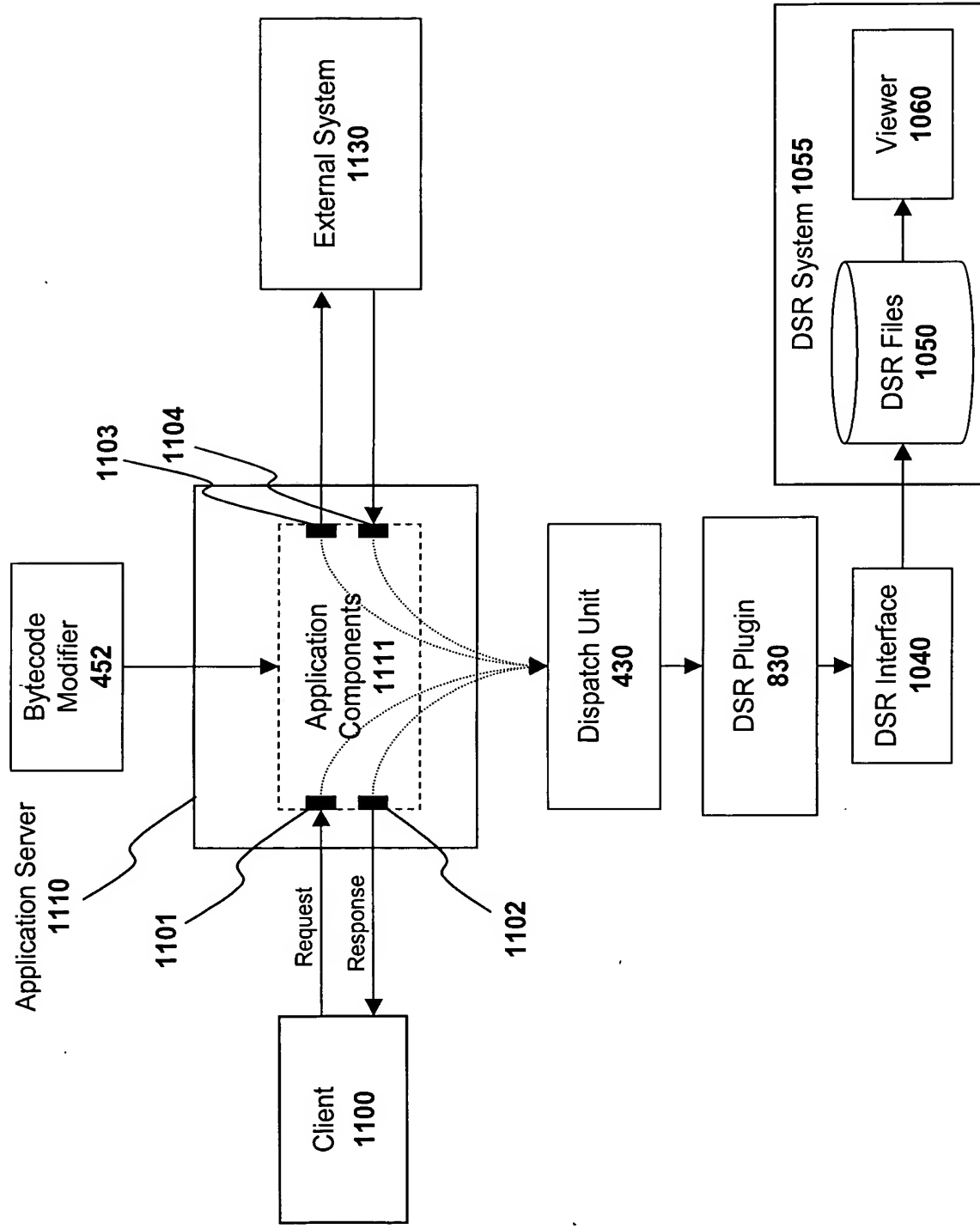


FIG. 11A

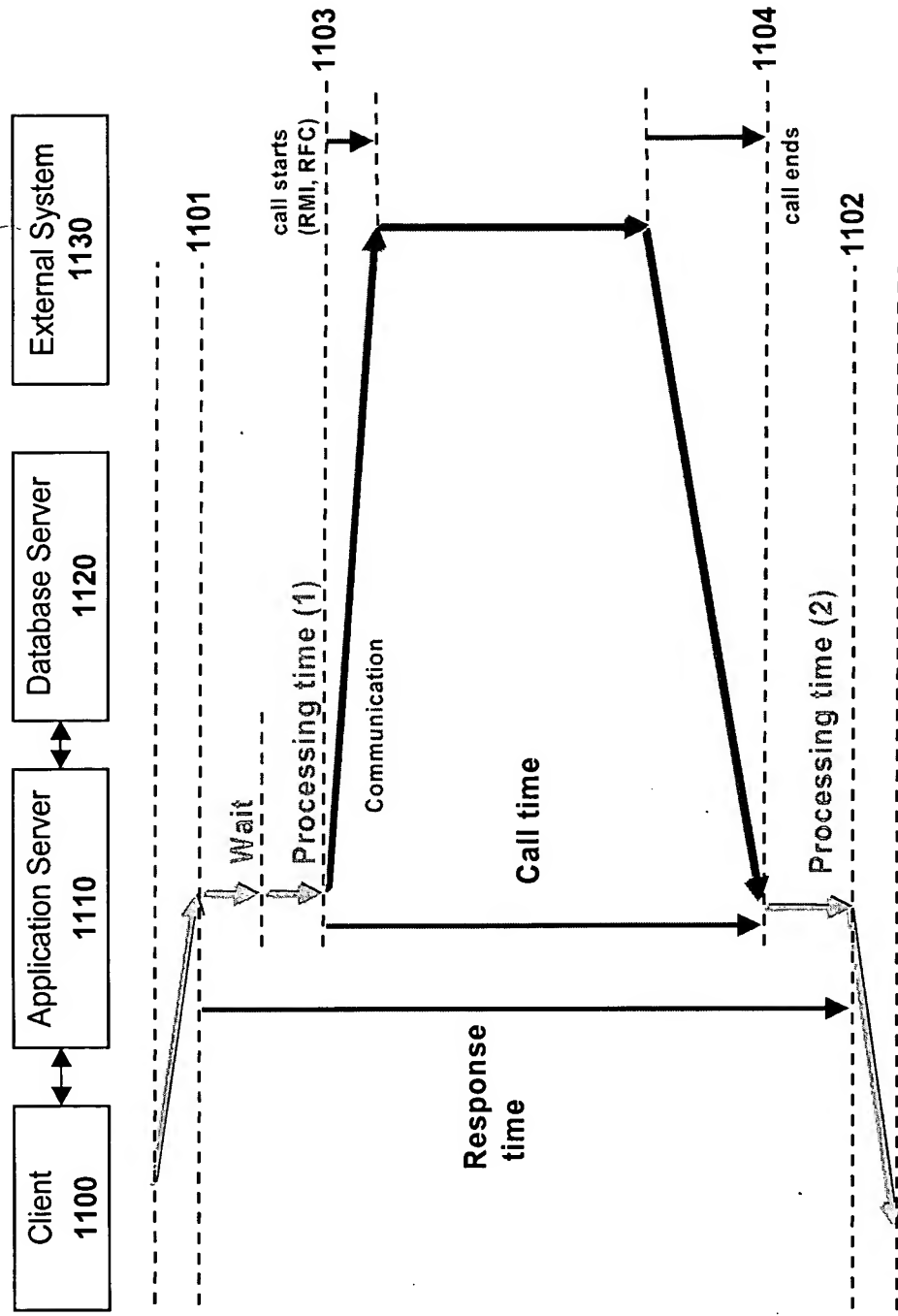


FIG. 11B

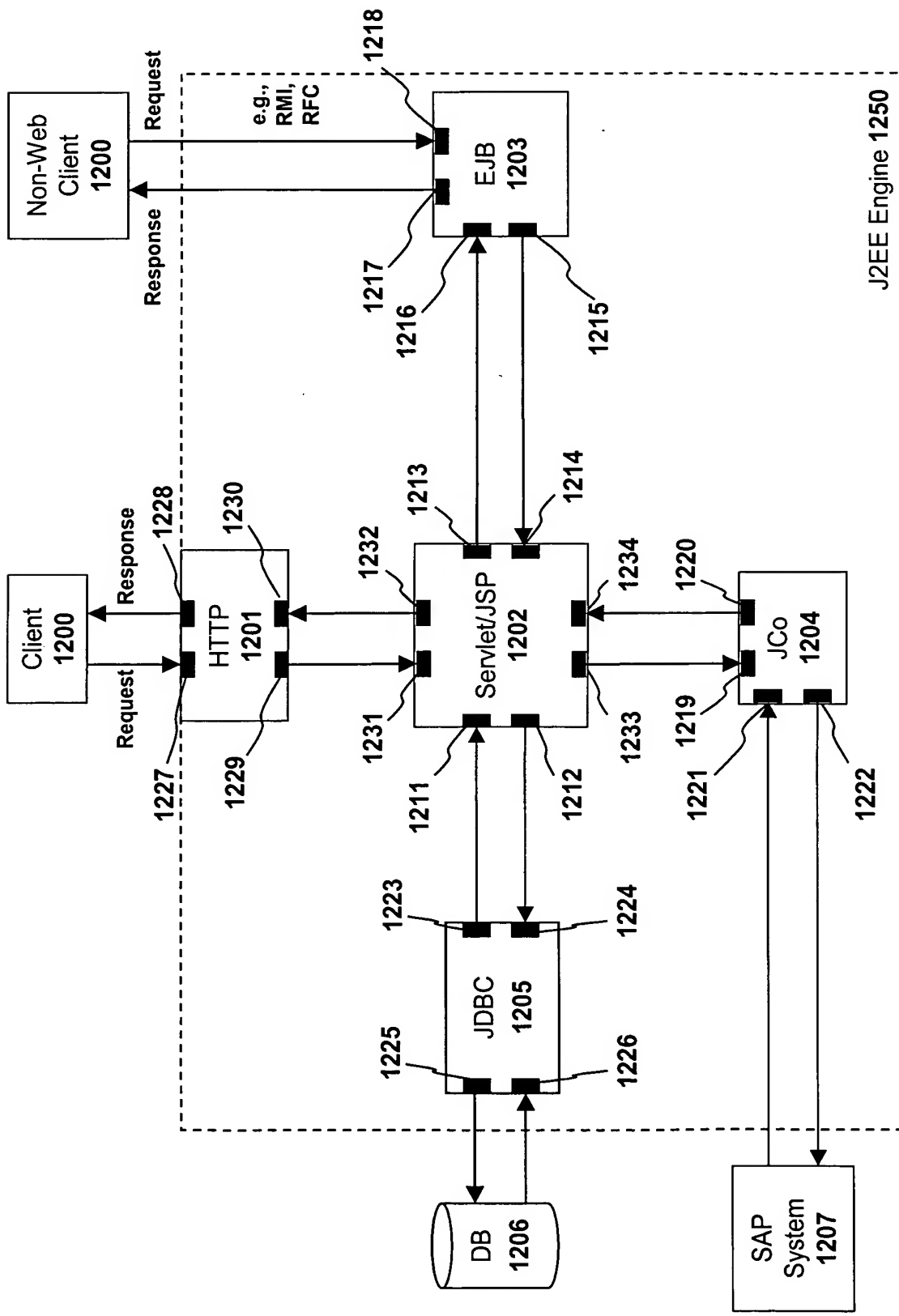


FIG. 12

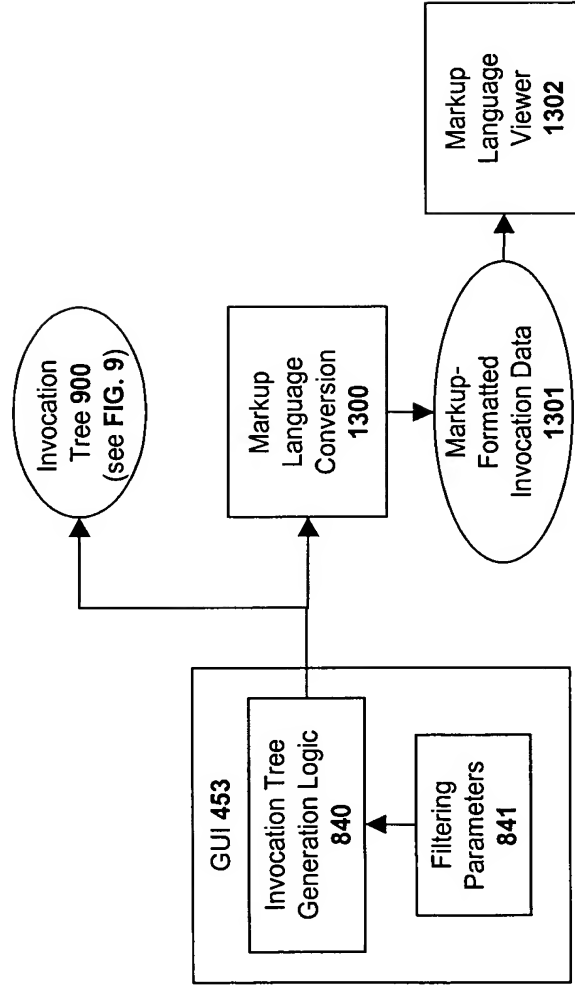


FIG. 13

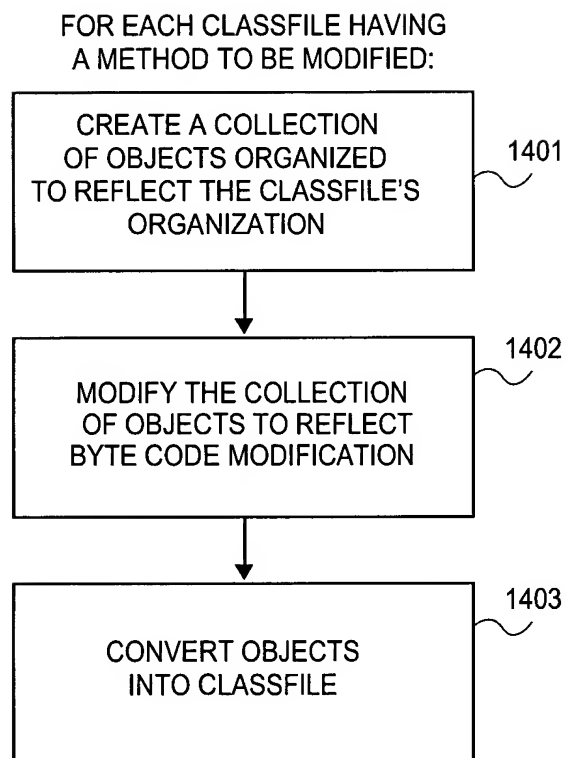


FIG. 14

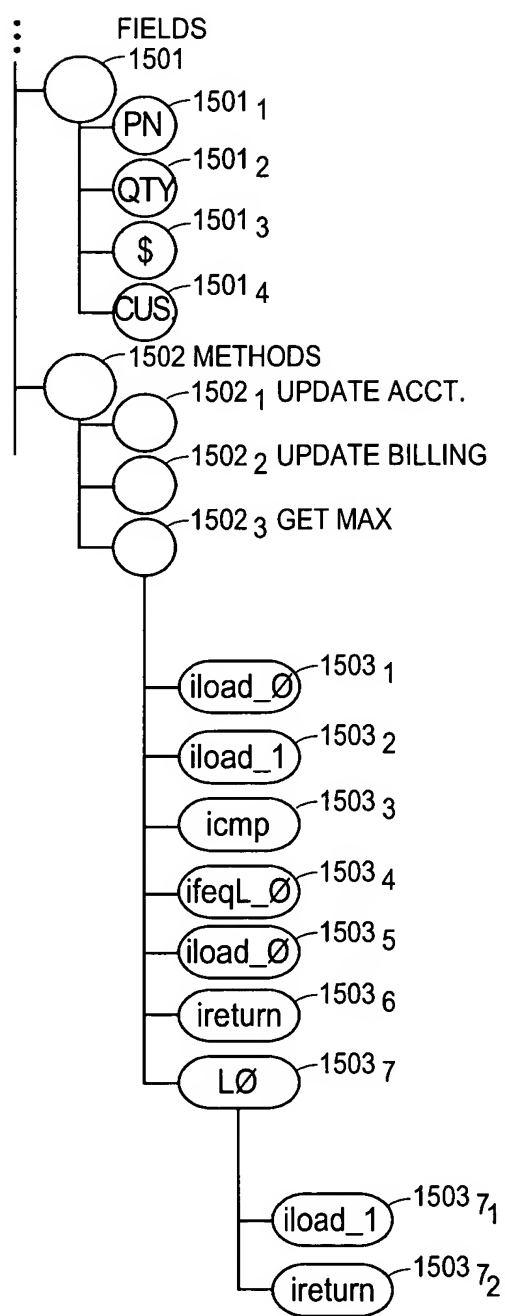


FIG. 15A

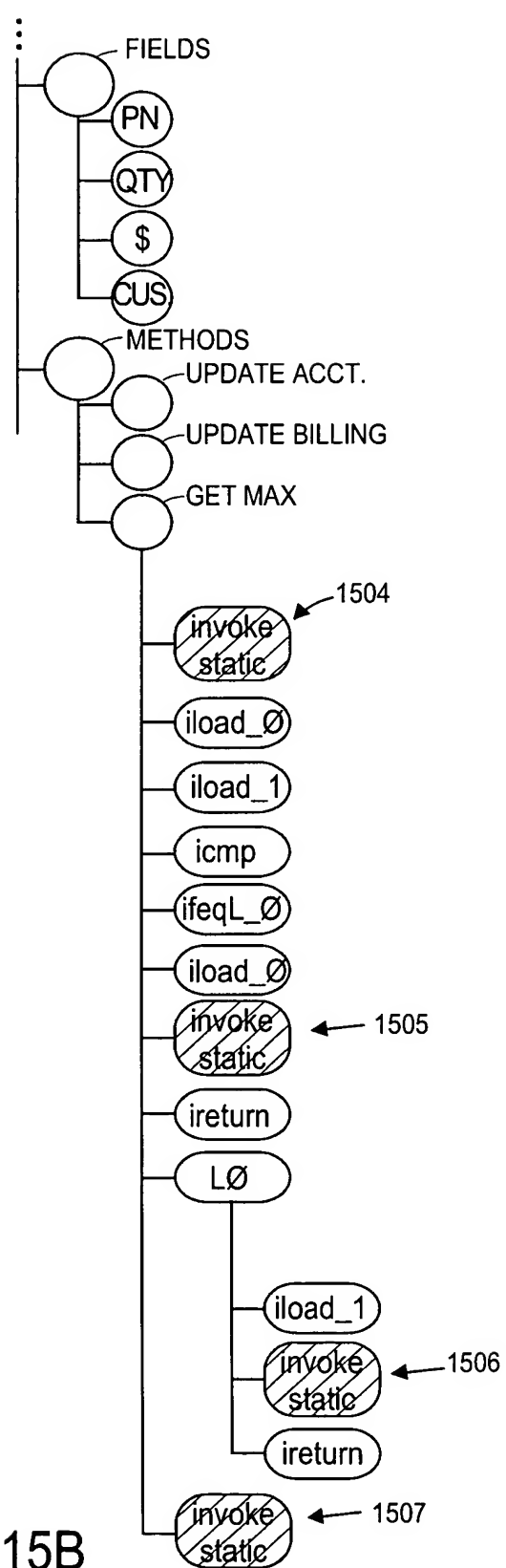


FIG. 15B

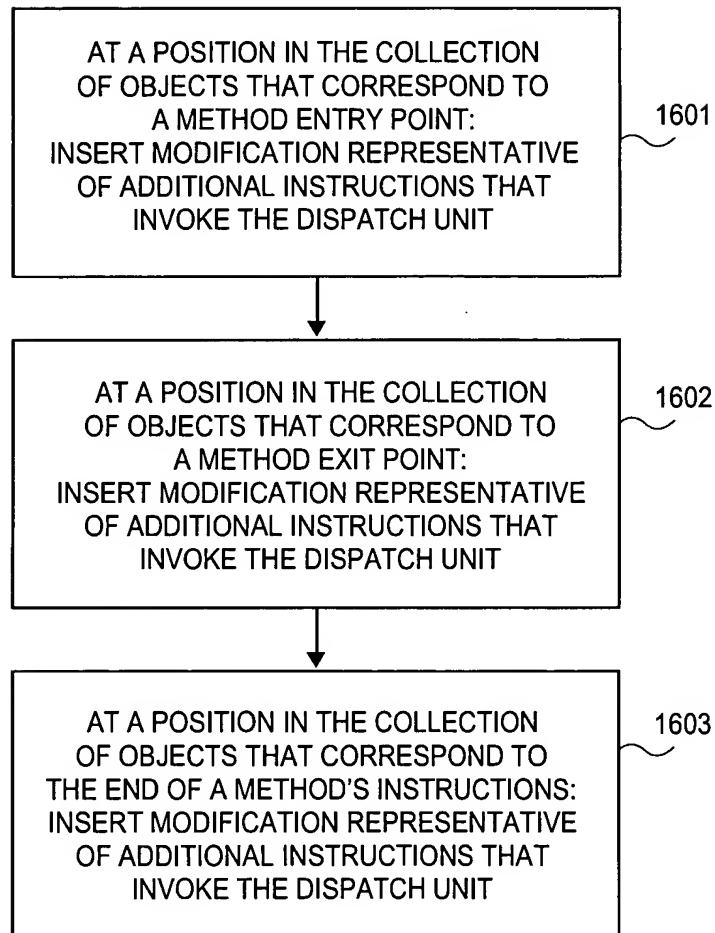


FIG. 16

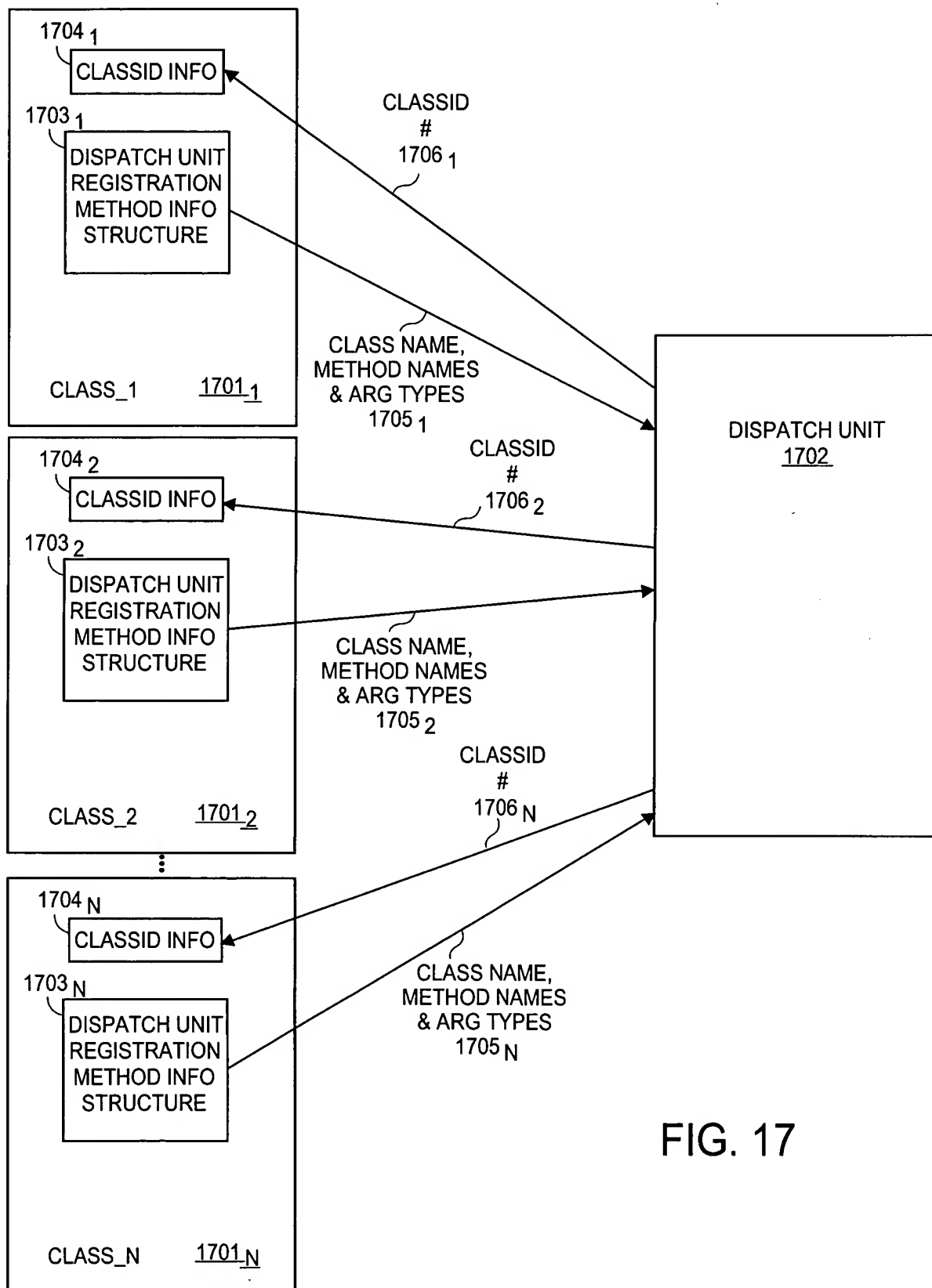


FIG. 17

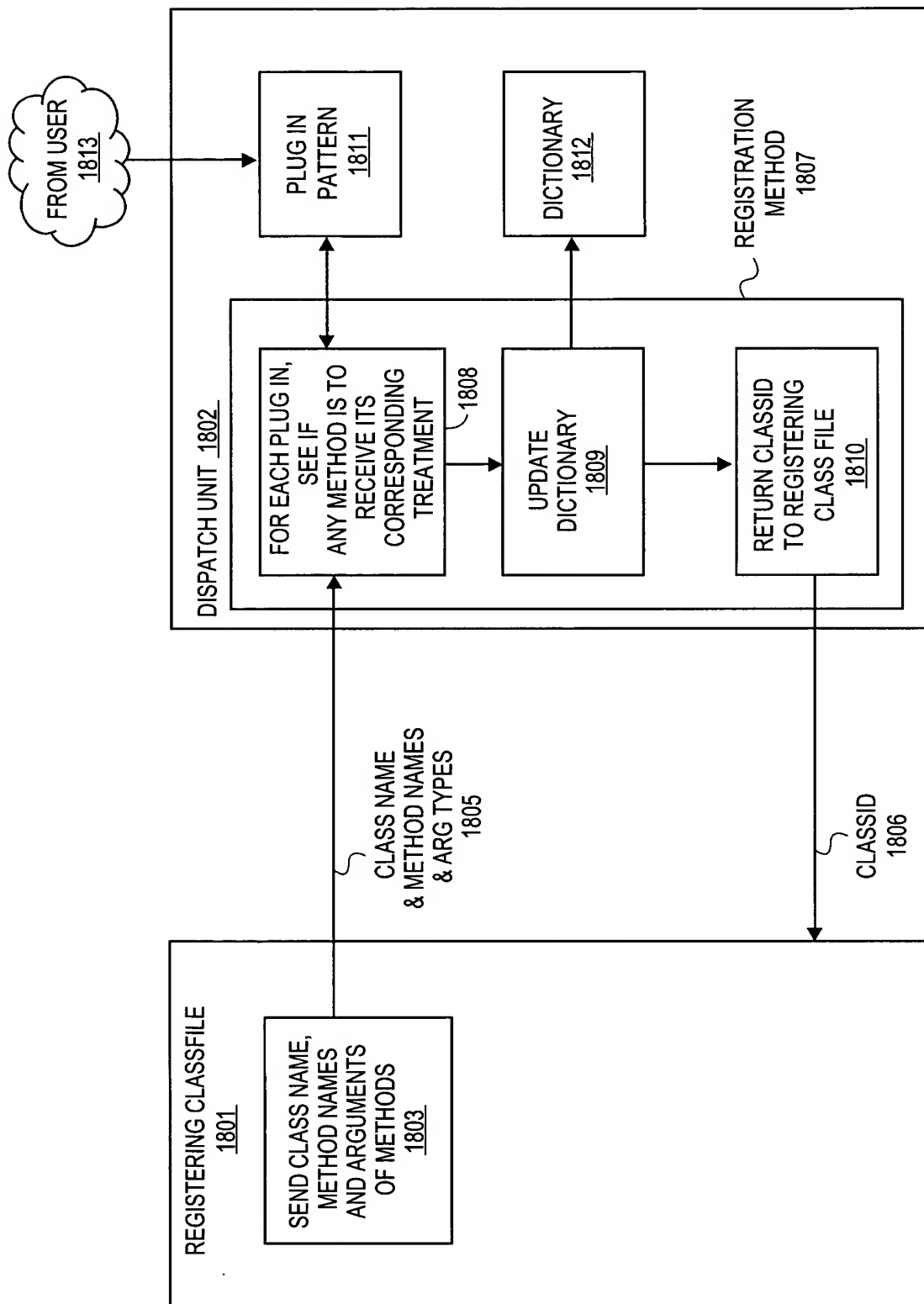


FIG. 18

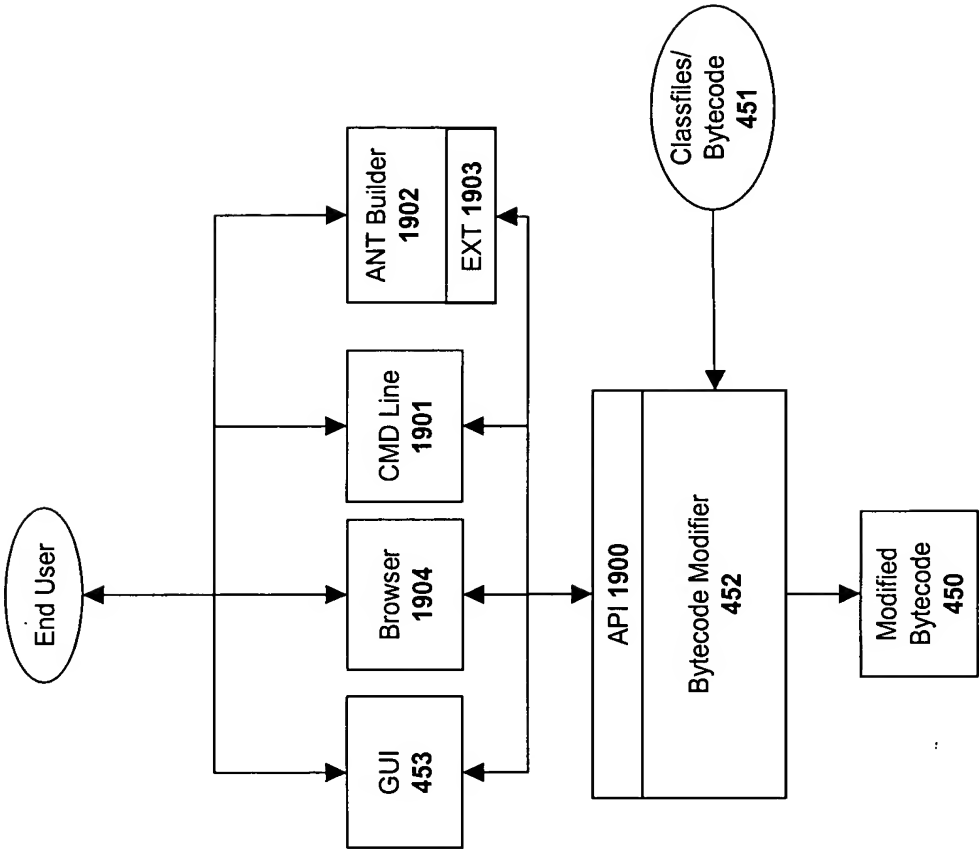


FIG. 19A

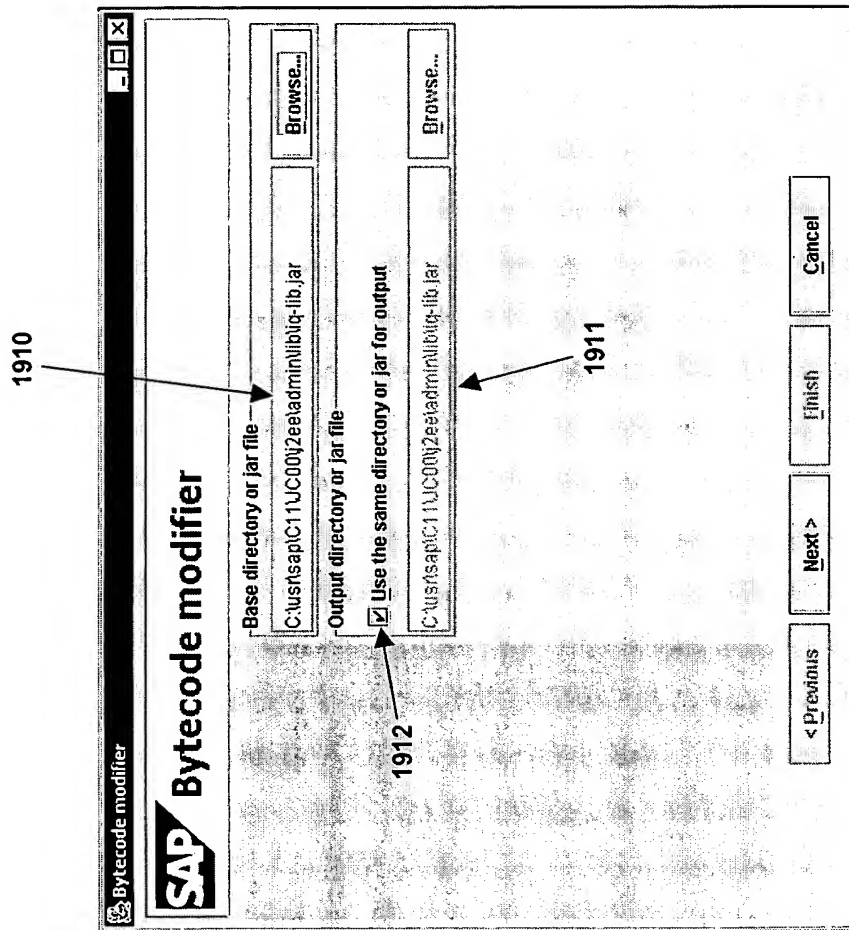
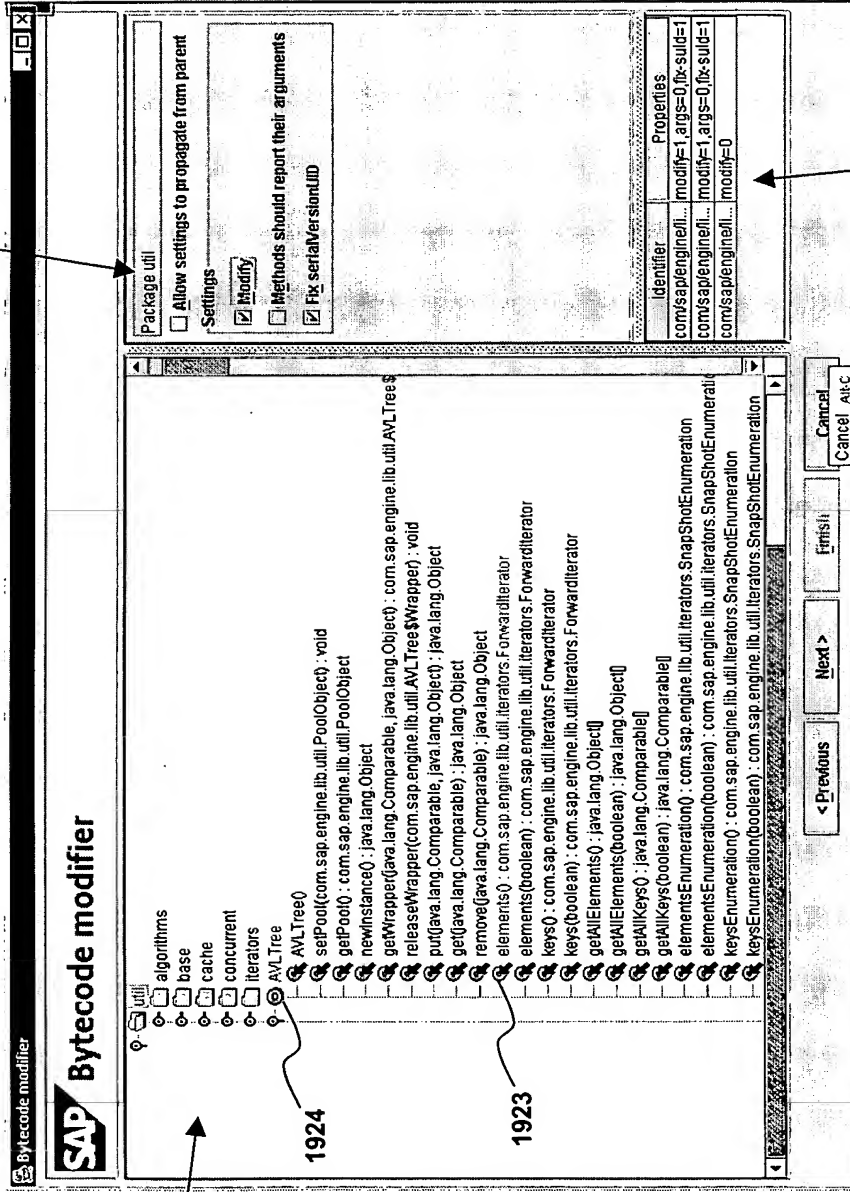


FIG. 19B

1921



1922

FIG. 19C

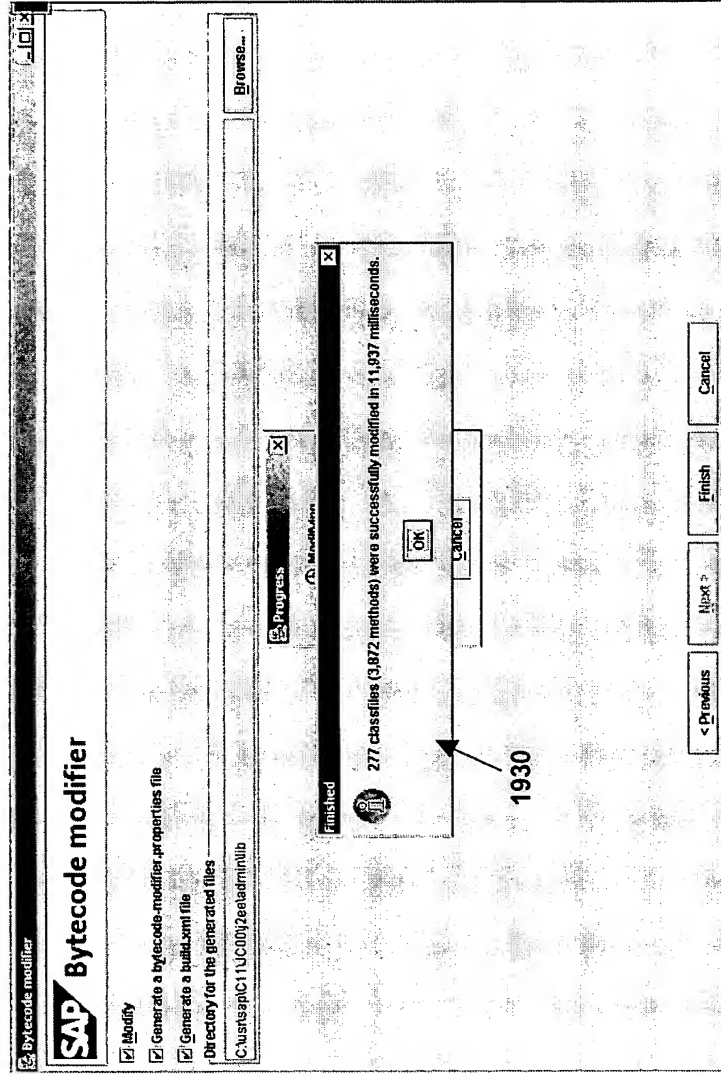
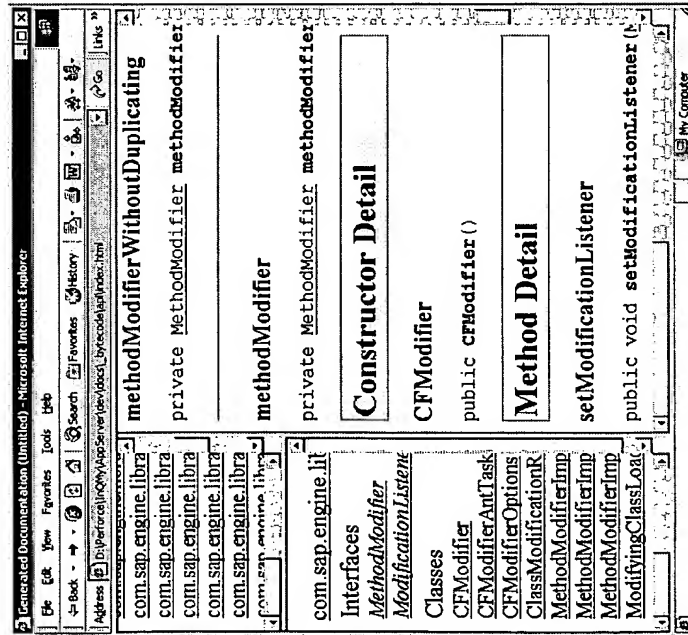


FIG. 19D



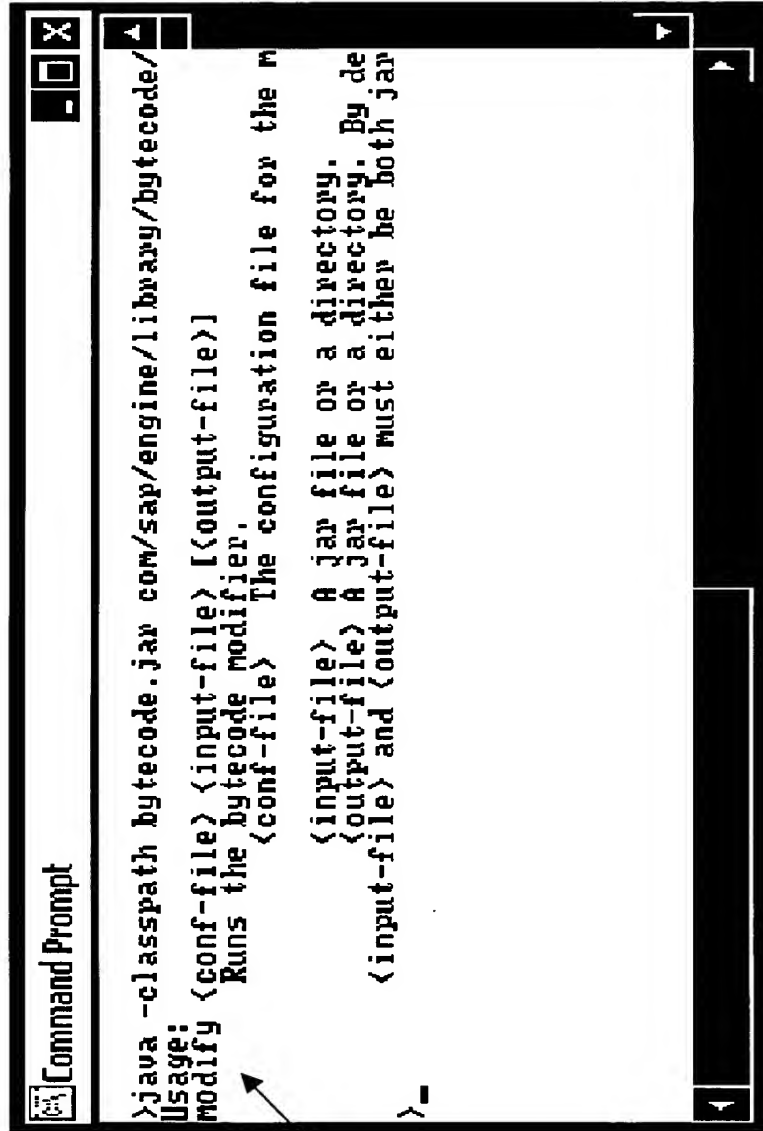
1940

```
// Direct modification of a file
CFModifier modifier = new CFModifier();
modifier.modify("D:/temp/A.class", null);

// Modification in a classloader
Class defineModifiedClass(byte[] data) {
    CFModifier modifier = new CFModifier();
    byte[] data1 = modifier.modify(data);
    return defineClass(data1);
}
```



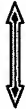
FIG. 19E



1901

FIG. 19F

ANT Builder 1902
EXT 1903



```
<taskdef name="modify"
  classname="com.sap.engine.library.bytecode.modifier.ModifierTask"
  classpath="bytecode.jar"/>
<modify conf="bytecode-modifier.properties"
  inputFile="D:\temp\classes" outputFile="D:\temp\classes1"
  check="true" verbosity="2" failonerror="true"/>
```

1950

FIG. 19G